M. Gordon

FACTS

Environment
Ontario
Jim Bradley, Minister

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POLYCHLORINATED BIPHENYLS (PCBs)
PCBs AND THE SAFE DESTRUCTION OF PCB WASTE

What are PCBs?

PCBs are clear, colorless, viscous liquids which look like mineral oil and are virtually insoluble in water.

PCBs are a chemical combination of chlorine with biphenyl, a derivative of benzene.

PCBs are thermally stable and non-flammable. These characteristics have prompted their commercial production and widespread industrial use since 1929, and have led to their persistent presence throughout our environment.

The North American production of PCBs began in 1929, and in 1977, when further manufacturing of PCBs was banned, it is estimated that about 700,000 tonnes had been produced. Approximately 40,000 tonnes were imported into Canada. Close to 60 per cent of these PCBs in Canada were present in consumer goods manufactured before 1972. It is believed that the current levels of PCBs in our environment are the result of improper dipsosal of the PCBs in consumer goods. Approximately 9,000 tonnes of high-concentration PCB liquids are still used in electical equipment in Ontario.

About 500,000 litres of PCB liquid wastes and a large volume of PCB-contaminated solids are in secure storage, awaiting disposal. The volume of stored waste is expected to increase as PCB-filled electrical equipment is replaced or taken out of service.

Environmental Concerns

PCBs are very stable in the environment. Virtually all PCBs that have entered the environment are still there.

PCBs have been introduced into the environment through open burning or incomplete incineration of material containing PCBs; by evaporation from paints, coatings and plastics; by direct entry or leakage into sewers and streams; by dumping in non-secure landfill sites; and by other disposal techniques which did not destroy the material. There have also been more than 330 reported spills of PCB fluids in Canada involving the release of approximately 90 tonnes of material.

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Because PCBs are virtually insoluble in water and water treatment removes particles they may be attached to, they pose little threat to drinking water. However, they are soluble in organic media, such as fatty tissue, where they are stored and concentrated. They concentrate further as they move up the food chain through aquatic plants, birds, fish and other animals. Eventually, they will accumulate in humans who consume the fish and animals.

Some sport fish have high levels of PCB contamination. People are advised to read Environment Ontario's Guide to Eating Ontario Sport Fish for advice about the consumption of fish which may contain PCBs, mercury and other contaminants.

Commercial fish catches in the Great Lakes cannot exceed the federal guideline of two parts per million of PCBs in edible fillets, a level established by Health and Welfare Canada.

Are PCBs Dangerous?

Studies conducted on animals in the 1960s indicated that PCBs have the potential to cause cancer in some animal species and can also interfere with reproductive processes.

Although there is little scientific evidence linking animal studies on PCBs with humans, what evidence there is has prompted environmental and health authorities to protect people from exposure to PCBs.

How Were PCBs Used?

PCBs have been used mainly in the electrical industry, as they provided a safe cooling and insulating fluid for industrial transformers and capacitors.

PCBs have been also used as a hydraulic fluid; as a surface coating for carbonless copy paper; as a plasticizer in sealants, caulkings, synthetic resins, rubbers, paints, waxes, and asphaults; and as a flame retardant in lubricating oils.

Restriction of PCBs

As a result of a volutary ban on the sale of PCBs by the sole North American producer, Monsanto Chemical Corporation, none have been sold since 1972 in North America for applications which could cause them to spread. While PCBs were never produced in Canada, they have been used widely here.

Since 1977, PCBs have been restricted in Canada under the federal Environmental Contaminants Act to closed-cycle uses, such as electrical transformers, so as to reduce the possibility of them getting into the environment. In July 1980, the use of PCBs in Canada was further restricted.

Protective Measures

Environment Ontario requires that PCB-contaminated material ultimately be destroyed in an environmentally acceptable manner.

Regulations made under Ontario's Environmental Protection Act (EPA) provide for interim on-site storage by owners of PCB wastes, provided such storage is authorized by the ministry.

Transportation of PCB wastes to and from storage sites on public roads must be done by approved carriers licensed under the EPA and the federal Transportation of Dangerous Goods Act.

Towards the Safe Destruction of PCBs

Since 1979, Environment Ontario has spent about $2 million on research and development into methods for the destruction and disposal of PCBs.

PCB wastes, depending on their nature, may be treated in one of two ways. High strength PCB liquids and PCB-contaminated solids can be destroyed by high temperature thermochemical processes, such as incineration or pyrolysis.

Mineral oil contaminated with low levels of PCB (typically less than one per cent by weight) can be chemically decontaminated leaving a usable PCB-free fluid.

As an alternative to a centralized PCB treatment facility, Environment Ontario decided to support the use of mobile units, which destroy PCBs or decontaminate fluids on site. The use of mobile units eliminates the risk of spills during transportation of PCB-laden materials to a centralized facility.

The decontamination process occurs in enclosed vehicles. Continued monitoring and study show that there are no detectable emissions to the environment. Over two million litres of mineral oil have been successfully decontaminated since December 1986, when the first of five approved mobile decontamination units in the province started operation.

The first application has been received by the ministry for the mobile incineration of high-level PCB liquids and PCB-contaminated solids at the Smithville PCB waste storage site. Clean-up operations are expected to commence following technology approval and public hearings.